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Supplementary information

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Frequent rainfall-induced new particle formation within the canopy in the Amazon rainforest

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Supplementary Information

Frequent rainfall-induced new particle formation within the canopy in the Amazon rainforest

By Machado L.A.T et al.

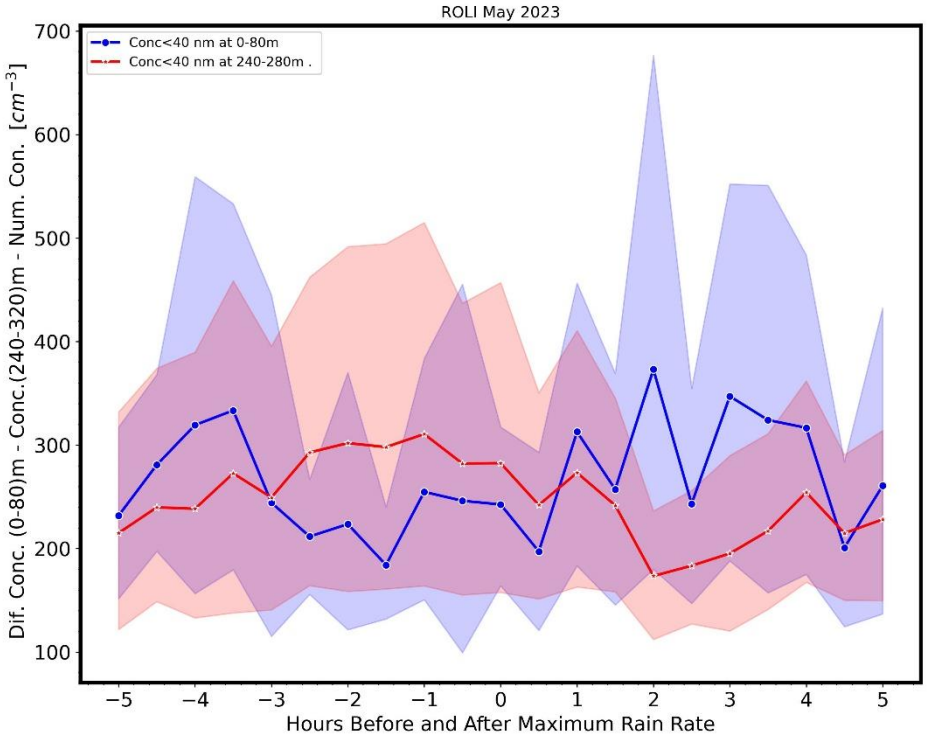


Figure S1. Median concentration of particles with size smaller than 40 nm per cm^{-3} for ATTO in May 2023, measured by the elevator (ROLI), for the layer 0-80 m and 240-320 m, five hours before to five hours after the maximum rainfall event. The data was resampled to 30-minute time steps, which include one upward and one downward measurement. The 30-minute concentrations at (0-80 m) and (240-320 m) were analyzed as a function of the rainfall events (37 events) following the same methodology employed in the other composites. Shadow are 95% confidence intervals. The concentration of particles smaller than 40 nm near canopy is larger than at the upper levels after rain events.

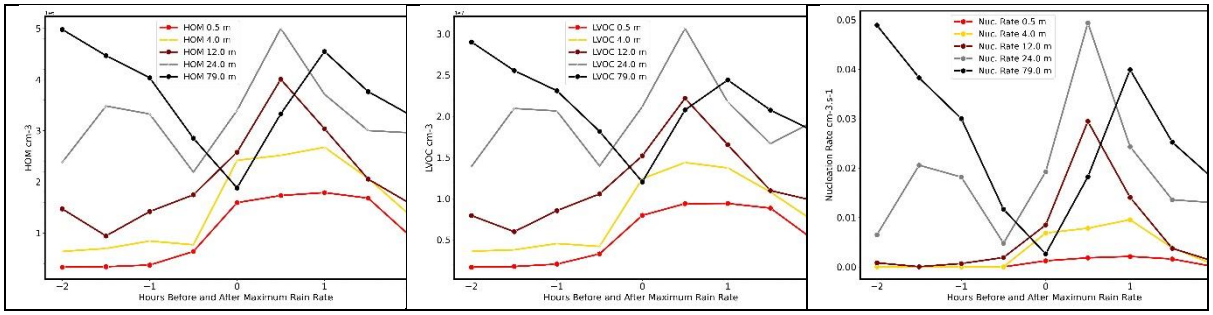


Figure S2. Box Model Simulations for HOM, LVOC, and the pure biogenic nucleation rate for typical Amazonian wet season 2 hours before to 2 hours after rain events.

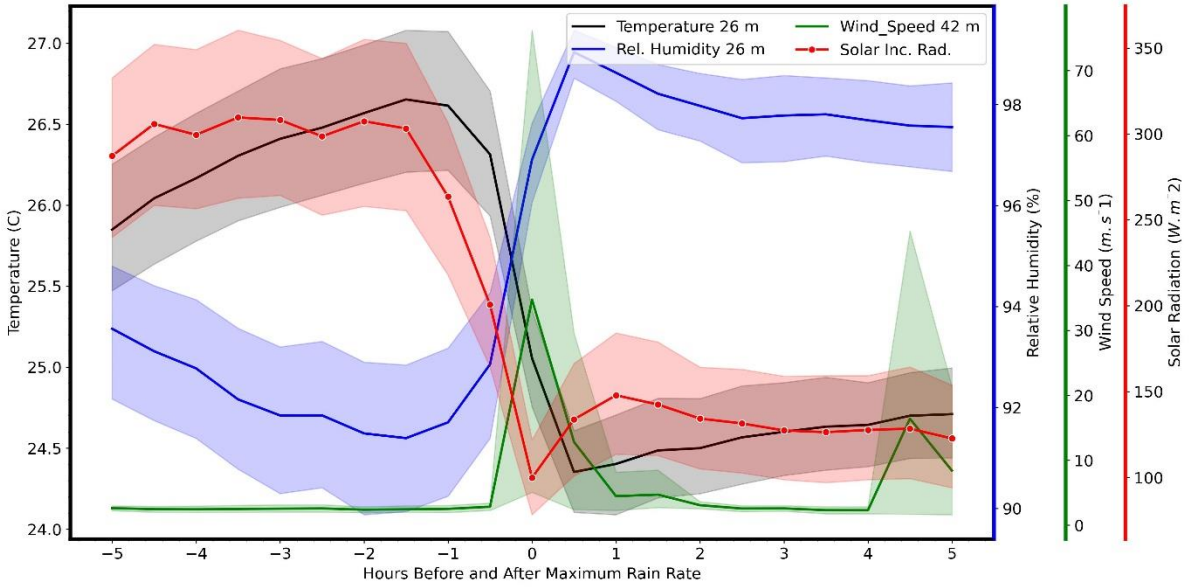


Figure S3. Average and 95% confidence interval (Shadow) for air temperature, specific humidity at 26 m, wind speed at 4, and incoming solar radiation at 79 m, on the instant tower, between 2018-2020, February-May, five hours before to five hours after the maximum rainfall event. The data were averaged over 391 rain events with rain rates >0.5 mm h^{-1}

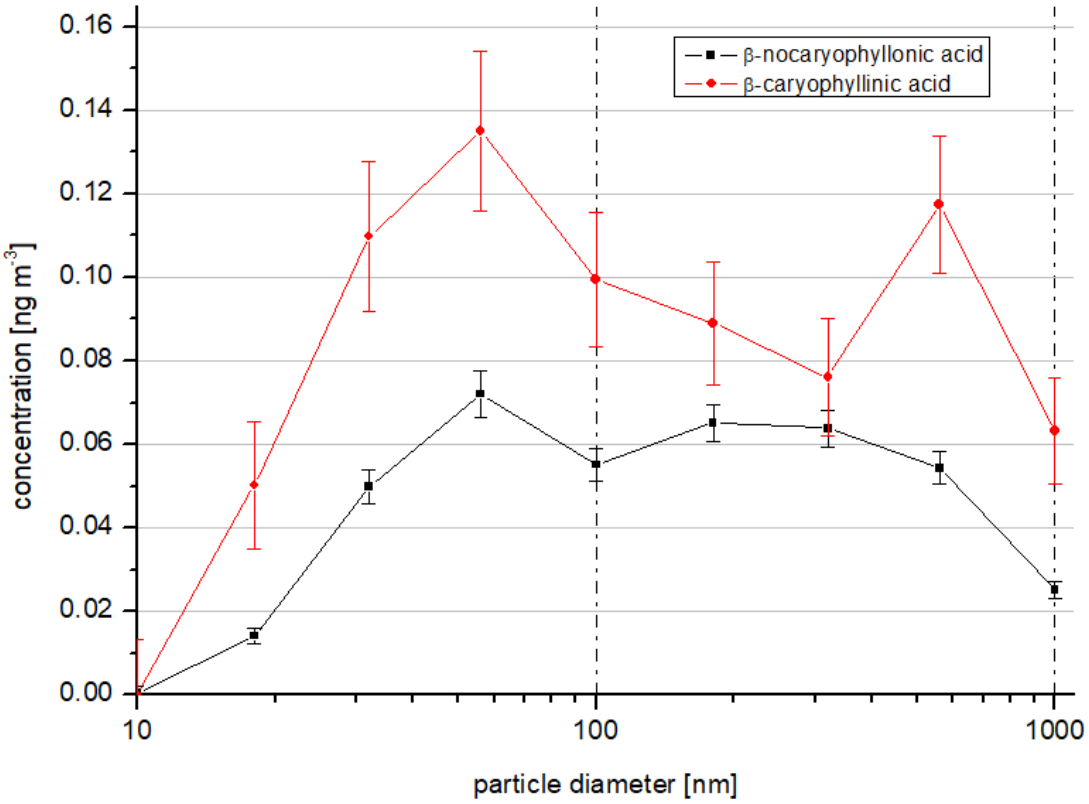


Figure S4. Concentration profiles of *β*-nocaryophyllonic acid and *β*-caryophyllinic acid at 60 m heights during 5 days in May 2022 as a function of the particle size.

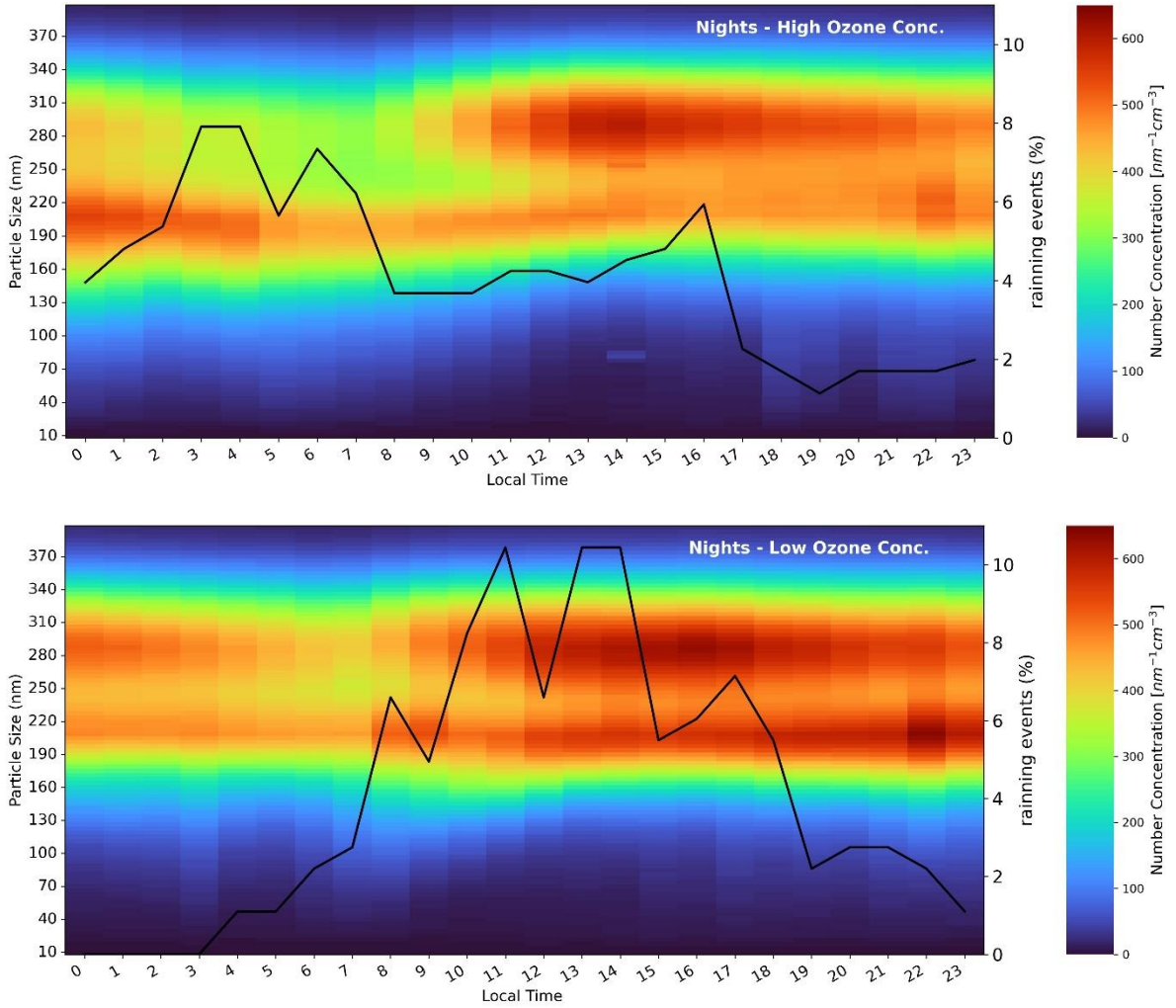
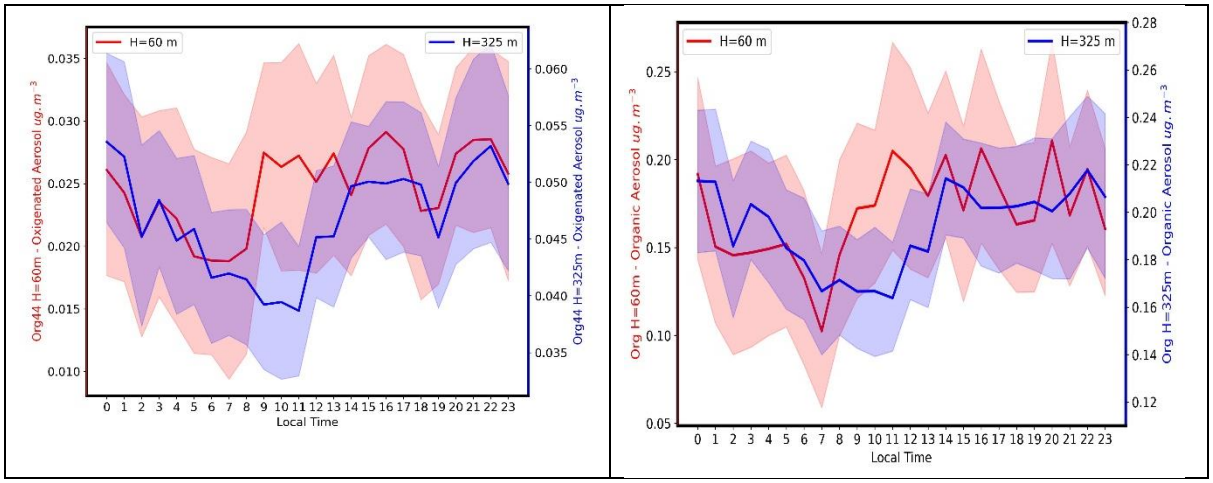


Figure S5. Diurnal cycle of the particle size distribution at ATTO at 60 m during February to May 2018-2020, for (A) nights with O_3 concentration above the 75% quantile and (B) nighttime O_3 below the 25% quantile. The right axis shows the frequency of rain events each half hour. Nights with higher O_3 concentrations show a clear growth process beginning at sunrise and continuing up to early afternoon. The average were made with 85 days.



A) **B)**

Figure S6. Diurnal cycle of the **A)** mass concentration of oxygenated aerosol (µg m^{-3}) and B) the organic aerosol mass (µg m^{-3}) measured by ACSM at ATTO at 60 m and 325 m during February-May 2021 and 2022. The data was collected in a dedicated campaign and was not measured continuously. At 60 m, the oxygenated aerosol increases mass at sunrise; only 2-3 hours after this increase is observed at 325 m. The early increase in the mass of the oxygenated aerosol indicates a process occurring near the canopy before the turbulent mixing of the convective boundary layer.